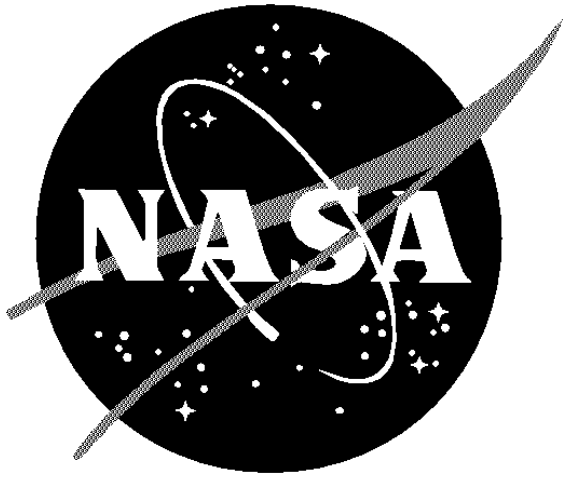

National Aeronautics and Space Administration

October 10, 1997

NRA-97-MTPE-12

RESEARCH ANNOUNCEMENT

OPPORTUNITIES TO PARTICIPATE IN THE LAND SURFACE HYDROLOGY PROGRAM

Step 1 proposals due November 21, 1997
Step 2 proposals due January 30, 1998

OMB Approval No. 2700-0087

OPPORTUNITIES TO PARTICIPATE IN THE LAND SURFACE HYDROLOGY PROGRAM

NASA Research Announcement
97-MTPE-12

Issued October 10, 1997
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Office of Mission to Planet Earth
National Aeronautics and Space Administration
Washington, DC 20546

I. Background and purpose of this NASA Research Announcement

NASA's Mission to Planet Earth enterprise endeavors to understand the total Earth system and the effects of natural and human-induced changes on the global environment. The Science Division of the Office of Mission to Planet Earth (MTPE) supports research and analysis that would promote and increase the use of remotely sensed information for detecting and evaluating environmental status and change at both regional and global scales. In support of research goals of the US Global Change Research Program (GCRP; *http://www.gcrio.org*) and of other national and international research programs, five interdisciplinary science themes that have reached sufficient maturity and hold the greatest promise of practical, near-term societal benefit have been identified for focused research in the context of longer-term goals of the Science Division; these themes are:

- Seasonal-to-interannual climate variability and prediction
- Long-term climate: natural variability and change
- Atmospheric ozone research
- Land-cover change and land-use change research
- Natural hazards research and applications

There are important hydrologic aspects to all themes except atmospheric chemistry. The Land Surface Hydrology Program, one of 17 disciplinary programs in the Science Division (*http://www.hq.nasa.gov/office/mtpe/draftsciplan/mtpe-srp.htm*), has the goal of developing a predictive understanding of the role of water in land-atmosphere interactions, and to further the scientific basis of water resources management. The program, with a budget of $2.9 million in Fiscal Year 1997, currently consists of four elements:

a) Observational and modeling studies designed to understand large-scale soil moisture dynamics. Included are methods for describing the heterogeneity of soils, vegetation, and precipitation, as well as the role of topography, use of remote sensing techniques for surface soil moisture, and development and application of data assimilation techniques to incorporate soil moisture observations (in situ and remotely sensed) into coupled land-atmosphere models;
b) Support for development of regional coupled land-atmosphere models for water resources planning and management, and as tools for improving the performance of global models with respect to prediction of seasonal to interannual variability;
c) Development of techniques for monitoring changes in surface hydroclimatology due to changes in land cover and land use using remote sensing measurements and operational environmental data; and
d) participation in field and numerical experiments designed to improve the coupling of physical, biological, and chemical processes.

This NASA Research Announcement (NRA) seeks to strengthen the Land Surface Hydrology Program as well as its contributions to the interdisciplinary science themes in the following four topics:

1. Flood hazards
2. Participation in field and numerical experiments related to land-atmosphere interactions
3. Snow hydrology
4. Seasonal/interannual to decadal/century variability in terrestrial hydrologic systems

Proposals submitted in response to this announcement will be competing for approximately $4 million in Fiscal Year 1998. This NRA represents a first step by the Land Surface Hydrology Program toward supporting research through annual research announcements to strengthen the core science, and to enhance the contributions of the program to the interdisciplinary themes.

II. Guidance for proposers

A. Technical information and instructions for proposers

Appendix A provides technical information concerning the four priority topics for which proposals are sought under this NRA. Also included in Appendix A is the amendatory guidance for proposers that are specific to this solicitation. *Please note that this solicitation involves two stages: Step 1 requires brief, summary proposals and Step 2 requires full proposals. Also note that the amendatory guidance shall be used wherever conflicts exist with the general instructions for responding to NASA Research Announcements which are included in Appendix B.* Appendix C contains instructions for foreign participation in this opportunity. The proposal cover page is provided in Appendix D. The institutional certifications required for full proposals are included in Appendix E.

B. Eligibility

Participation in the Land Surface Hydrology Program is open to all categories of domestic and foreign organizations, including institutions of higher education, industry, non-profit organizations, NASA centers, and other government agencies. With regard to proposals from US government research laboratories, civil service salary costs are not reimbursable. Participation by non-US scientists is encouraged within the guidelines described in Appendix C, which include a no-exchange-of-funds provision.

C. Proposal submission and schedule

Proposals submitted in response to this NRA will be subjected to peer review utilizing either mail or panel evaluation, or both. A NASA management review of technical and logistical feasibility and cost analysis will also be conducted. Step 1 proposals should include a cover page (institutional authorizing signatures not required) and up to 5 pages of text, single-spaced, with type no smaller than 12-pt., including abstracts and references. Proposers will be notified by NASA regarding its review of Step 1 proposals in four rating categories: *1) high priority, 2) medium priority, 3) low priority, and 4) non-responsive or inappropriate*. All Step 1 proposers are eligible to respond with full Step 2 proposals; however, full proposals from the Step 1 proposals rated in categories 3 or 4 are discouraged. Full proposals furnished with institutional authorizing signatures should adhere to the format and page limitations given in Appendix A. The schedule is:

Step 1 proposals due by 5 p.m., EDT, November 21, 1997
Notification of Step 1 recommendations: by December 12, 1997
Step 2 proposals due by 5 p.m., EDT, January 30, 1998
Announcement of selections: by March 20, 1998

Submit proposals to:

Identifier: NRA 97-MTPE-12
Land Surface Hydrology
Code Y
400 Virginia Avenue, SW, Suite 700
Washington, DC 20024
Telephone: 202/554-2775

Copies required: 10

Submit one additional copy of foreign proposals to:

NASA Headquarters
Office of External Relations
Mission to Planet Earth Division
Mail Code IY
300 E Street, SW
Washington, DC 20546-0001

Selecting official: Director, Science Division
Office of Mission to Planet Earth

Inquiries: Dr. Dennis Lettenmaier
Mail Code YS
NASA Headquarters
300 E Street, SW
Washington, DC 20546-0001
TEL: 202/358-1847
FAX: 202/358-2771
Email: dennis.lettenmaier@hq.nasa.gov

Your interest and cooperation in participating in this opportunity are appreciated.

William F. Townsend
Acting Associate Administrator for
Mission to Planet Earth

Enclosures:

Appendix A
Technical Information on Research Sought under NRA 97-MTPE-12 and
Amendatory Guidance for Proposers

This appendix provides background technical information regarding the research topics to be supported under this NRA. Section I describes the four priority topics. The content and evaluation of Step 1 proposals are discussed in Section II. The format and evaluation of full proposals for Step 2 are discussed in Section III. The guidelines below shall be used wherever conflicts exist with the general instructions for responding to NASA Research Announcements given in Appendix B.

I. Priority topics

Proposers should identify the specific priority topic(s) to which they are responding. Proposals without this identification or without an identifiable connection to one of the priority topics may be judged non-responsive to this NRA.

Priority topic 1: Flood hazards

Of all natural hazards, floods consistently rank among the highest in terms of property damage and loss of life. Since 1993, five of the seven weather-related natural disasters with over $1 billion in damages have been floods. Over 75 percent of all presidential disaster declarations are for floods. The 1993 Mississippi River floods were the second costliest natural disaster in US history (exceeded only by the Northridge earthquake). Despite improved understanding of weather and its predictability, and the existence of sophisticated flood warning systems, flood losses continue to rise. Flood hazards result from a complex interaction of surface atmospheric conditions (especially intense precipitation), catchment hydrologic characteristics and response, and structural and nonstructural flood control measures. Opportunities exist for reduction of flood hazards through two broad strategies: a) improved estimation of flood risk, and associated land use management decisions that reduce property damage and loss of life; and b) improved real-time forecasting of floods, and associated warning and mitigation strategies. Both strategies will be aided by better scientific understanding of the watershed as an integrated system. NASA encourages studies applicable to a range of catchment sizes, hydrologic responses, and storm characteristics (ranging, e.g., from summer flash floods associated with convective storms in the central and eastern US to rain-on-snow and spring snowmelt flooding in the West). Studies that address the uses and limitations of remote sensing observations in flood frequency estimation and flood forecasting are particularly encouraged. Proposed work should incorporate, or eventually have the potential to incorporate, remotely sensed or derived parameters such as topography, land cover, recent regional and temporal rainfall history, soil moisture, snow cover (and water equivalent), snow melt, and/or river stage for observation and monitoring.

It is expected that research and developmental activities will constitute the central focus of this activity, and all proposals are expected to have a strong science focus, that is, they should develop or use information about the physical mechanisms that lead to floods, rather than just describing flood events. However, a limited number of case studies that demonstrate innovative applications of remote sensing technologies, particularly in cooperation with management agencies, will be considered appropriate as well. Case

studies could extend data bases such as those produced by the Scientific Assessment and Strategy Team (SAST) of the Interagency Flood Plain Management Review Committee for the 1993 Mississippi floods (*http://edcwww2.cr.usgs.gov/sast-home.html*) along with remote sensing observations to determine retrospectively if key remote sensing parameters and/or time series observations would have been useful for improved forecasting of locations and severity of flooding. Proposers of case studies are encouraged to form teams that include all levels of federal, state, and local governments, disaster management practitioners, and industry, as well as the research community. Proposals that deal strictly with flood monitoring and/or data collection are not appropriate to this NRA.

Investigations selected under this topic will be expected to contribute to NASA's Solid Earth and Natural Hazards (SENH) Program, e.g., through participation at SENH investigators meetings. For more details about the SENH Program, applicants are encouraged to review NRA 97-MTPE-10 (*http://www.hq.nasa.gov/office/mtpe/mtpe.html*). Please note that proposals that specifically address issues of flood hazards are to be submitted under this NRA, and not NRA 97-MTPE-10.

Priority topic 2: Participation in field and numerical experiments on land-atmosphere interaction

An important aspect of improving our understanding of the transfer of moisture and energy at the land surface is collection and analysis of field data suitable for development and testing of predictive models. The World Climate Research Program (WCRP) has fostered several programs that are designed to support better understanding of the hydrological cycle and energy fluxes at the land surface. The most prominent of these are the Continental Scale Experiments (CSEs) of the Global Water and Energy Experiment (GEWEX). The first of the GEWEX CSEs is the GEWEX Continental Scale International Project (GCIP), which is taking place in the Mississippi River basin; others include the Baltic Sea Experiment (BALTEX), GEWEX Asian Monsoon Experiment (GAME), Large-scale Biosphere-Atmosphere Experiment in Amazonia (LBA), and Mackenzie GEWEX Study (MAGS).

The goal of the CSEs is to predict, by means of suitable models, the variations of the hydrological regime of major continental areas, including their impact on atmospheric and surface dynamics, and variations in regional hydrological processes and water resources. Because GCIP was the topic of a recent NOAA-NASA joint research announcement, *proposals focused exclusively on GCIP are specifically excluded from this NRA.* However, an important aspect of the GEWEX CSEs is the intercomparison of GEWEX prediction capability across the CSEs, e.g., using models developed and/or evaluated in one CSE for the other CSEs. To date, few efforts along these lines have been initiated, other than the routine activities of the global weather prediction centers. Therefore, proposals which involve multiple GEWEX CSEs, one of which is GCIP, will be considered responsive to this NRA. Given that four of the five CSEs (GCIP, BALTEX, GAME, and MAGS) have important cold region/cold season aspects, studies focusing on these aspects of the models and/or data are particularly encouraged. Those considering submitting proposals that address GEWEX CSE intercomparisons are encouraged to consult with the GEWEX Hydrometeorological Panel (GHP; *http://www.tor.ec.gc.ca/GEWEX/GHP/ghp.html*). Another large-scale WCRP project in which hydrologic involvement would be appropriate to this NRA is the Arctic Climate

System Study (ACSYS; *http://www.npolar.no/acsys*). Among the hydrologic objectives of ACSYS are the development of better estimates of the net inflow of freshwater to the Arctic basin, and improved understanding of the feedbacks between the land surface and atmosphere that control interannual variability in these fluxes. An NRA that will provide opportunities for participation in the hydrologic component of LBA will soon be released. For this reason, proposals that address LBA science or other issues are not appropriate to this NRA.

Proposals which can demonstrate a unique role for NASA participation in other, more modest, experiments that are designed to lead to improved prediction of land-atmosphere interactions are encouraged as well. These could include, for instance, CASES (the Cooperative Atmosphere-Surface Exchange Study (*http://laurel.mmm.ucar.edu:80/cases/*). Opportunities for research using data from the Southern Great Plains 1997 (SGP97) Hydrology Experiment (*http://hydrolab.arsusda.gov/sgp97/*) will be included in a future NRA, expected to be issued in Spring, 1998, and are not appropriate to this solicitation.

Proposals that make use of data collected during previous field experiments in ways to contribute to the goals of the Land Surface Hydrology Program and the MTPE themes are encouraged. Proposals could be based primarily on numerical, rather than field, experiments, particularly when these proposals make good use of observational data.

Priority topic 3: Snow hydrology

Snow plays an important role in regional climate, because it has a higher albedo than any other natural surface. More than 30 percent of the earth's land surface is covered seasonally by snow, and about 10 percent is covered permanently with snow or ice. Over major portions of the middle and high latitudes, and at high elevations in the tropical latitudes, snow and alpine glaciers are the largest contributors to runoff in rivers and to ground-water recharge. Estimating both the quantity of water held by seasonal snow packs and timing of snowmelt are hydrologic problems that have important implications for water resources management. Operational hydrology and climatology require timely measurement of snow-pack parameters. Notwithstanding the important role of snow in global, regional, and local hydrology, difficult logistical problems hamper data collection, and scale mismatches between in situ data and the river basin scale have hampered the development of predictive models. On the other hand, remote sensing products relevant to snow processes have only recently become routinely available, and their utilization in operational hydrology is still the exception rather than the rule.

Proposals are sought that address improvement of snow process representation in predictive models, and/or use of remotely sensed snow products. Proposals are particularly encouraged that utilize remote sensing products to improve and/or update model representations of snow processes. This solicitation is not restrictive with respect to spatial scale; successful proposals could be addressed to any scale ranging from point to global. However, projects that make use of physically based predictive tools will be preferred to empirical methods, and in any event, projects are expected to place a strong emphasis on physical understanding of snow properties and snow hydrology. Among areas that could be considered are: a) parameterization of subgrid snow processes (such as fractional snow covered area and spatial variation in water equivalent and/or depth) in land

atmosphere models; b) methods for updating hydrologic forecasting models using remotely sensed, and/or combinations of remotely sensed and in situ data; c) demonstration of improved use of snow remote sensing for water management. With respect to c); projects that include a case study and/or demonstration performed cooperatively with one or more operational/management entities are especially encouraged.

Priority topic 4: Understanding seasonal-to-interannual variability in terrestrial hydrologic systems

Hydrologic state variables and fluxes, such as subsurface moisture storage and runoff, exhibit variability at seasonal/interannual (S/I) to decadal/century time scales as a result of external climatic forcing, as well as the interaction and internal dynamics of terrestrial hydrologic systems. Variability at S/I scales, in particular, has important implications for the theoretical understanding of hydrologic responses and feedbacks over a range of spatial scales. It also is important for the predictability of the hydrologic systems, which in turn could lead to improvements in water management. For instance, S/I forecasts of hydrologically important surface variables (especially precipitation and temperature) have the potential to be incorporated in hydrologic forecasts (in particular, of streamflow). However, important research questions remain in making the transition from surface climate to hydrology. These questions reflect mismatches in spatial scale, and the sensitivity of the terrestrial hydrologic systems to even modest biases in surface climate forecasts. Proposals are solicited that are aimed at better understanding of the hydrological processes that control and/or are affected by S/I variability. In addition, proposals that address ways in which fundamental understanding of S/I variability could be exploited for improved management of water resources are of interest. Some possible topics within this area include:

- What are the implications of seasonal to interannual climate forecasts for flood prediction and forecasting?

The potential may exist for predicting changes in flood risk (e.g., the magnitude of the n-year flood) dependent on the current (or forecasted) climate state over a range of spatial scales, from catchments which are primarily susceptible to flash floods, to large, continental river basins, where it may be possible to predict the evolution and timing of specific flood events. The latter is particularly true in situations where antecedent conditions (such as soil moisture and snow moisture storage) exert a strong influence on future runoff.

- What are the implications of S/I climate forecasts for drought prediction and forecasting?

Three kinds of drought can be identified: meteorological drought, agricultural drought, and hydrologic drought. The first is defined in terms of anomalies in surface meteorological records, the second is defined in terms anomalies in soil moisture, and the third in terms of streamflow anomalies (perhaps averaged over an appropriate time period). Proposals responding to this question could address any of the three areas, so long as the implications for hydrologic drought are clearly made.

- What are the implications of S/I climate forecasts under “normal” climate conditions?

There may be a considerable benefit in terms of improved water use efficiency for the development of S/I forecasts under "normal" conditions. Opportunities for improving S/I hydrological forecasts may exist under normal climatic conditions, and methods of incorporating S/I climate forecasts under these conditions could have greater long-term economic benefit than forecasts under less frequent flood or drought situations.

II. Content and evaluation of Step 1 proposals

Step 1 proposals are required of all who are interested in responding to this NRA. Step 1 proposals should include 1) a cover page (Appendix D), 2) up to 5 pages of text, single-spaced, with type no smaller than 12-pt., including abstract and references, and 3) curriculum vitae, less than 2 pages in length, for each investigator. The main text should describe concisely the research to be conducted, motivation and expected consequences, technical approach, and an estimate of cost *(what, why, how, and how much*). Signatures of authorizing officials from submitting institutions are not required for Step 1 proposals.

Step 1 proposals will be reviewed on the basis of intrinsic merit, relevance to NASA mission and objectives, and the estimated cost. The evaluation criteria, in order of decreasing importance, are:

1. Relevance and responsiveness of proposed research to this NRA
2. Scientific and technical merit
3. Estimated cost

Following the Step 1 review, NASA will place each proposal in one of the following categories:

1) *high priority* (well-conceived and innovative proposals of high programmatic relevance and high scientific and technical merit)
2) *medium priority* (relevant proposals of sound scientific and technical merit)
3) *low priority* (proposals of less relevance, and/or containing major scientific or technical deficiencies, and/or projecting high costs relative to the expected scientific returns)
4) *non-responsive/inappropriate* (proposals not relevant to this NRA, and/or with scientific or technical flaws, and/or with cost estimates exceeding resources appropriate under this NRA)

Proposers will be notified as soon as possible, but no later than December 12, 1997, of the categorization of their respective proposals. Proposers of *high-priority* Step 1 proposals will be specifically encouraged to submit full proposals for Step 2. Full proposals from *medium-priority* Step 1 proposals will be acceptable. Full proposals from *low-priority* Step 1 proposals will be considered, but are discouraged. Proposers of *non-responsive or inappropriate* Step 1 proposals are strongly discouraged to submit a full proposal to this NRA. Step 2 proposals are due January 30, 1998.

III. Format and evaluation of Step 2 proposals

Only those proposals whose objectives and methodologies have been evaluated in Step 1 will be considered. Proposals whose objectives and methodologies have changed from Step 1 will not be evaluated in Step 2.

The content of Step 2 proposals should provide sufficient detail to allow the reviewers to assess the value of the proposed research, its contribution to NASA, and the likelihood that the investigators will accomplish the stated objectives within the requested resources and schedule. Proposals that do not adhere to the format below or the stated page limitations will not be reviewed.

1. Cover Page (See Appendix D)
2. Table of contents (Paginated)
3. Project Summary (Maximum length, 1 page)
4. Technical Plan (Maximum length, 15 pages, including all figures and charts, reference cited, and schedule and data plan if applicable)
5. Management Plan (Maximum length, 1 page, for large or complex efforts involving interactions of numerous individuals or organizations)
6. Cost Plan (applicable to proposals from US institutions only; annual and cumulative budgets for no more than 3 years accompanied by justifications and explanatory notes)
7. Current and Pending Support (listing title, source, amount, and period of performance of the support received by each investigator)
8. Biographical Sketches (short vitae, listing only biographical, academic or professional essentials, and publications most relevant to the proposed research within the last 5 years)
9. Required Certifications (See Appendix E)

Additional materials may be appended only when an informed review is not possible without them; these may include accepted manuscript yet to appear in print, background on new measurements or instrumentation, or letters on collaboration by scientists or organizations from other countries.

The evaluation criteria for Step 2 proposals are described below. Criterion 1 is the most important; criteria 2 and 3 are approximately of equal weight.

1. Intrinsic merit, including scientific innovation and technical soundness in concepts and approaches, capability of the investigator(s), and the likelihood of leading to fundamental advances in knowledge and field practice.
2. Relevance and responsiveness of proposed research to this NRA
3. Realism and reasonableness of proposed cost, including its relation to resources available under this NRA

NASA may elect to support only a portion of the proposed investigation, pending successful negotiation. In cases of meritorious proposals of similar content or scope, NASA may recommend joint participation as a single project. In cases of partial or full duplication in content of an existing project or a proposal pending with another source, NASA will confer with the responsible source before a final disposition of the proposal.

Appendix B

INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS (JANUARY 1997)

(a) **General**.

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRAs contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRAs.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument. Contracts resulting from NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement. Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

(b) **NRA-Specific Items**. Several proposal submission items appear in the NRA itself: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more information. Items included in these instructions may be supplemented by the NRA.

(c) The following information is needed to permit consideration in an objective manner. NRAs will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) **Transmittal Letter or Prefatory Material**.

(i) The legal name and address of the organization and specific division or campus identification if part of a larger organization;

(ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;

(iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;

(iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;

(v) Identification of other organizations that are currently evaluating a proposal for the same efforts;

(vi) Identification of the NRA, by number and title, to which the proposal is responding;

(vii) Dollar amount requested, desired starting date, and duration of project;

(viii) Date of submission; and

(ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

(2) **Restriction on Use and Disclosure of Proposal Information**. Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

Notice
Restriction on Use and Disclosure of Proposal Information

The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

(3) **Abstract**. Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) **Project Description**.

(i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) **Management Approach**. For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) **Personnel**. The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) **Facilities and Equipment**.

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

(8) **Proposed Costs**.

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges; consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(9) **Security**. Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

(10) **Current Support**. For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) **Special Matters**.

(i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(ii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

(d) **Renewal Proposals**

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

(e) **Length**. Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

(f) **Joint Proposals**.

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

(g) **Late Proposals**. A proposal or modification received after the date or dates specified in an NRA may be considered if doing so is in the best interests of the Government.

(h) **Withdrawal**. Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

(i) **Evaluation Factors**

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

(j) **Evaluation Techniques**. Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

(k) **Selection for Award**.

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

(l) **Cancellation of NRA**. NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

Appendix C
GUIDELINES FOR FOREIGN PARTICIPATION

NASA accepts proposals from entities located outside the US in response to this NRA. Proposals from non-US entities should not include a cost plan as they are made on a no-exchange-of-funds basis. Non-US proposals, and US Proposals that include non-US participation, must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the non-US participant is proposing. Such endorsement should indicate the following points: (1) The proposal merits careful consideration by NASA; and (2) If the proposal is selected, sufficient funds will be made available by the sponsoring foreign agency to undertake the activity as proposed.

Proposals, along with the requested number of copies and Letter of Endorsement must be forwarded to NASA in time to arrive before the deadline established for this NRA. In addition, one copy of each of these documents should be sent to:

NASA Headquarters
Office of External Relations
Mission to Planet Earth Division, Code IY
Washington, DC 20546
USA

Any materials sent by courier or express mail should include the street address 300 E Street, S. W., and substitute 20024 for the indicated ZIP code.

All proposals must be typewritten in English. All non-US proposals will undergo the same evaluation and selection process as those originating in the US. Non-US proposals and U. S. Proposals that include non-US participation, must follow all other guidelines and requirements described in this NRA. Sponsoring non-US agencies may, in exceptional situations, forward a proposal without endorsement to the above address, if review and endorsement are not possible before the announced closing date. In such cases, however, NASA's Mission to Planet Earth Division of the Office of External Relations should be advised when a decision on the endorsement is to be expected.

Successful and unsuccessful proposers will be contacted directly by the NASA Program Office coordinating the NRA. Copes of these letters will be sent to the sponsoring government agency.

Appendix D

Proposal Cover Page
Land Surface Hydrology Program (NRA 97-MTPE-12)

Proposal No. _____ (Leave Blank for NASA Use)

Title: _____

Principal Investigator:

Name: _____

Department:_____

Institution: _____

Street/PO Box: _____

City: _____ State: _____ Zip: _____

Country: _____ E-mail: _____

Telephone: _____ Fax: _____

Co-Investigators:
Name/Institution/Telephone/email

_____

_____

_____

Priority topics

____ 1. Flood hazards
____ 2. Participation in field and numerical experiments on land-atmosphere interaction
____ 3. Snow hydrology
____ 4. Seasonal/interannual to decadal/century variability in terrestrial hydrologic systems

Budget:

Year 1 _____ Year 2 _____ Year 3 _____ total _____

Requested Start Date: _____ **Requested Duration**: _____

Authorizing Official: _____ _____
(Name) (Institution)

Appendix E

CERTIFICATION REGARDING DEBARMENT,
SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY
MATTERS (MAR 1996)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that--

(i) The Offeror and/or any of its Principals--

(A) Are * are not * presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have * have not *, within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(C) Are * are not * presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in subdivision (a)(1)(i)(B) of this provision.

(ii) The Offeror has * has not *, within a three-year period preceding this offer, had one or more contracts terminated for default by any Federal
agency.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

THIS CERTIFICATION CONCERNS A MATTER WITHIN THE JURISDICTION OF AN AGENCY OF THE UNITED STATES AND THE MAKING OF A FALSE, FICTITIOUS, OR FRAUDULENT CERTIFICATION MAY RENDER THE MAKER SUBJECT TO PROSECUTION UNDER SECTION 1001, TITLE 18, UNITED STATES CODE.

Organization Name PR/Award Number or Project Name

Name and Title of Authorized Representative

Signature Date

CERTIFICATION AND DISCLOSURE REGARDING PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (APR 1991)

The offeror, by signing its offer, hereby certifies to the best of his or her knowledge and belief that on or after December 23, 1989,--

(1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan, or cooperative agreement;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with this solicitation, the offeror shall complete and submit, with its offer, OMB standard form LLL, Disclosure of Lobbying Activities, to the Contracting Officer; and

(3) He or she will include the language of this certification in all subcontract awards at any tier and require that all recipients of subcontract awards in excess of $100,000 shall certify and disclose accordingly.

Signature and Date

Name and Title of Authorized Representative

Organization Name